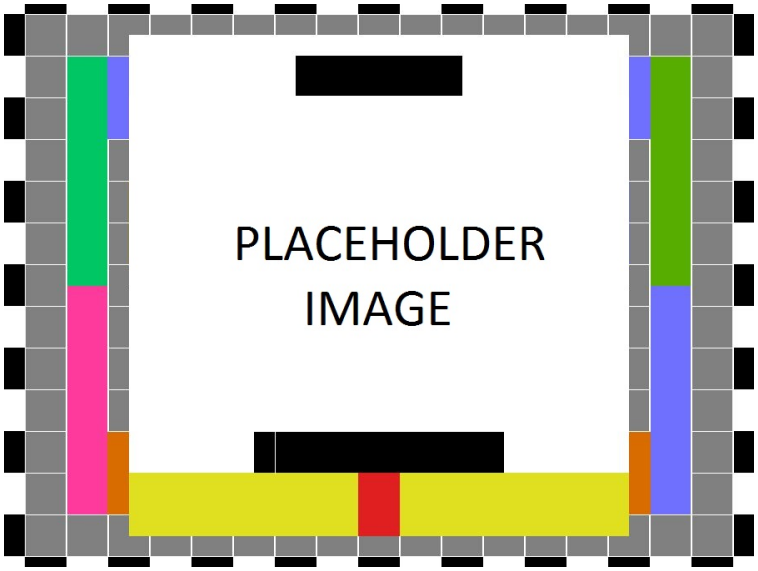
Department of Computer Science & Engineering
The University of Texas at Arlington

Project Charter
CSE 4316: Senior Design I
Fall 2019



Team Name
Out Reach Robot

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Revision History

Revision	Date	Author(s)	Description
0.1	09.19.2019	JC	document creation

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1 Vision

To get people interested in Computer Science and Engineering by showing a project that displays what graduates with these majors can accomplish.

2 Mission

We are going to build an drawing app for a tablet that connects with a robotic arm. The robotic arm will draw whatever is drawn on the tablet.

3 Success Criteria

Upon completion of the system, we expect the following success indicators to be observed:

- System is able to function for at least 60 minutes of activity (copying what someone draws) without the need for reboot.
- System is able to copy what the user draws with 70 percent accuracy.

Within 1 months before the delivery date, we expect the following success indicators to be observed:

- Application is able to communicate with robotic arm.
- System is able to function for at least 5 minutes of activity (copying what someone draws) without the need for reboot.
- System is able to copy what user draws with 30 percent accuracy

Within 2 months before the delivery date, we expect the following success indicators to be observed:

- Robotic arm is complete and able to draw.
- Application is complete.

Within 3 months before the delivery date, we expect the following success indicators to be observed:

- Application on tablet is able to run, but not 100 percent complete.
- Robotic arm is able to draw basic lines on paper with basic movements.

4 Background

The purpose of this project is to wow potential students of computer science/engineering with a project that will be able to be completed in the span of two semesters. Most people are interested in things of the future. While we may use robots today in certain applications, robots are not yet common place. A robotic arm drawing what you draw on a tablet will be used to provide that wow factor. It will make the student think if a robotic arm can copy what I draw on this tablet what else can it do? This system will let the potential student know if they choose to pursue engineering they too can work of technologies of the future if they decide to do so.

5 Related Work

Discuss the state-of-the-art with respect to your product. What solutions currently exist, and in what form (academic research, enthusiast prototype, commercially available, etc.)? Include references and citations as necessary using the *cite* command, like this [**?**]. If there are existing solutions, why won't they work for your customer (too expensive, not fast enough, not reliable enough, etc.). This section should occupy 1/2 - 1 full page, and should include at least 5 references to related work. All references should be added to the *.bib* file, fully documented in IEEE format, and should appear in the *references* section at the end of this document (the IEEE citation style will automatically be applied if your reference is properly added to the *.bib* file).

ProTip: Consider using a citation manager such as Mendeley, Zotero, or EndNote to generate your *.bib* file and maintain documentation references throughout the life cycle of the project.

6 System Overview

Explain, at a high level, how you will implement a solution to the problem. Include a diagram of major components to the system (not a full architectural design, but a high level overview of the major system components and how a user or external system might interface). Avoid specific implementation details (operating system, programming languages, etc.). This section should occupy at least 1 full page.

7 Roles & Responsibilities

The stakeholders are the teams members working on this project which are Jesee, Alex, Sedick, Pratikshya and Jeswin. The project sponsor is Dr.Conly, he is our point of contact for the customer as well. The team members responsibilities are divided as follows. Jesee and Sedick will work on the operation of the robotic arm. Alex, Pratikshya and Jeswin will work on the application for the tablet used to draw. All team members will work on the communication between the two. The scrum master will remain Jesee for all scrums, his main responsibility will be communication with the project sponsor.

8 Cost Proposal

This section contains the approximate budget for the project, where that money will come from, and any other support. This text should be replaced with a discussion and justification of major expenses, but not the actual monetary amounts (that will go in the preliminary budget section below).

8.1 Preliminary Budget

Include a high level budget table for components, fabrication, software licensees, development hardware, etc. This should be in a tabular format broken up into appropriate line items.

8.2 Current & Pending Support

What are all of the funding sources for the project, and are there any potential funding sources that haven't been secured yet? List all funding sources (including the default funding amount provided by

the CSE department) and their dollar amounts.

9 Facilities & Equipment

What lab space, testing grounds, makerspaces, etc. will you need to complete the project? Will you require any specific equipment, and if so, where will you get it (borrow, lease, purchase, outsource, already present in the lab, etc.). This section should occupy 1/2 page.

10 Assumptions

An assumption is a belief of what you assume to be true in the future. You make assumptions based on your knowledge, experience or the information available on hand. These are anticipated events or circumstances that are expected to occur during your project's life cycle.

Assumptions are supposed to be true but do not necessarily end up being true. Sometimes they may turn out to be false, which can affect your project significantly. They add risks to the project because they may or may not be true. For example, if you are working on an outdoor unmanned vehicle, are you assuming that testing space will be available when needed? Are you relying on an external team or contractor to provide a certain subsystem on time? If you are working at a customer facility or deploying on their computing infrastructure, are you assuming you will be granted physical access or network credentials?

This section should contain a list of at least 5 of the most critical assumptions related to your project. For example:

The following list contains critical assumptions related to the implementation and testing of the project.

- A suitable outdoor testing location will be available by the 3rd sprint cycle
- The X sensing system developed by Sensor Consulting Company will be delivered according to specifications by the 4th sprint cycle
- Access to the customer installation site will be provided by the 5th sprint cycle
- The customer will provide ample power and network connectivity at the installation site
- The installation site network infrastructure will allow TCP network traffic on port 8080

11 Constraints

Constraints are limitations imposed on the project, such as the limitation of cost, schedule, or resources, and you have to work within the boundaries restricted by these constraints. All projects have constraints, which are defined and identified at the beginning of the project.

Constraints are outside of your control. They are imposed upon you by your client, organization, government regulations, availability of resources, etc. Occasionally, identified constraints turn out to be false. This is often beneficial to the development team, since it removes items that could potentially affect progress.

This section should contain a list of at least 5 of the most critical constraints related to your project. For example:

The following list contains key constraints related to the implementation and testing of the project.

- Final prototype demonstration must be completed by May 1st, 20XX
- The customer will provide no more than two maintenance personnel to assist in on-site installation

- Customer installation site will only be accessible by development team during normal business hours
- Total development costs must not exceed $800
- All data obtained from customer site must be reviewed and approved for release by the Information Security Office prior to being copied to any internet connected storage medium

12 Risks

This section should contain a list of at least 5 of the most critical risks related to your project. Additionally, the probability of occurrence, size of loss, and risk exposure should be listed. For size of loss, express units as the number of days by which the project schedule would be delayed. For risk exposure, multiply the size of loss by the probability of occurrence to obtain the exposure in days. For example:

The following high-level risk census contains identified project risks with the highest exposure. Mitigation strategies will be discussed in future planning sessions.

Risk description	Probability	Loss (days)	Exposure (days)
Availability of X sensor module due to contractor delay	0.50	20	10
Outdoor testing grounds are not available	0.20	14	2.8
Internet access not available at installation site	0.30	9	2.7
Delays in shipping from overseas vendors	0.10	20	2.0
Certification delays at compliance testing facility	0.15	10	1.5

Table 1: Overview of highest exposure project risks

13 Documentation & Reporting

13.1 Major Documentation Deliverables

These deliverables are major grade components of the course. Completing these documents should generally be the sprint goal during the applicable sprint period. Refer to current and previous course syllabi and schedules to estimate the due dates of these items. Remove this explanatory paragraph from your draft, but leave the heading.

13.1.1 Project Charter

Describe how this document will be maintained and updated (how often, under what circumstances, etc.). When will the initial version be delivered? When will the final version be delivered?

13.1.2 System Requirements Specification

Describe how this document will be maintained and updated (how often, under what circumstances, etc.). When will the initial version be delivered? When will the final version be delivered?

13.1.3 Architectural Design Specification

Describe how this document will be maintained and updated (how often, under what circumstances, etc.). When will the initial version be delivered? When will the final version be delivered?

13.1.4 Detailed Design Specification

Describe how this document will be maintained and updated (how often, under what circumstances, etc.). When will the initial version be delivered? When will the final version be delivered?

13.2 Recurring Sprint Items

The following items will be documented and maintained during each individual sprint. As above, remove this paragraph from your draft, but leave the heading.

13.2.1 Product Backlog

How will items be added to the product backlog from the SRS? How will these items be prioritized? Who makes the decision (product owner, group vote, etc.)? What software will be used to maintain and share the product backlog with team members and stakeholders?

13.2.2 Sprint Planning

How will each sprint plan be planned? How many sprints will there be (you need to look at the schedules for this course and previous Senior Design II courses during the appropriate semesters to figure this out).

13.2.3 Sprint Goal

Who decides the sprint goal? How will you involve your customer in this process?

13.2.4 Sprint Backlog

Who decides which product backlog items make their way into the sprint backlog? How will the backlog be maintained (collaboration software, a "scrum board", etc.)?

13.2.5 Task Breakdown

How will individual tasks be assigned from the sprint backlog? Will it be up to each team member to voluntarily claim a task, or will it come from the product owner? How will time spent on tasks be documented?

13.2.6 Sprint Burn Down Charts

Who will be responsible for generating the burn down charts for each sprint? How will they be able to access the total amount of effort expended by each individual team member? What format will the burn down chart use (include an example burn down chart below).

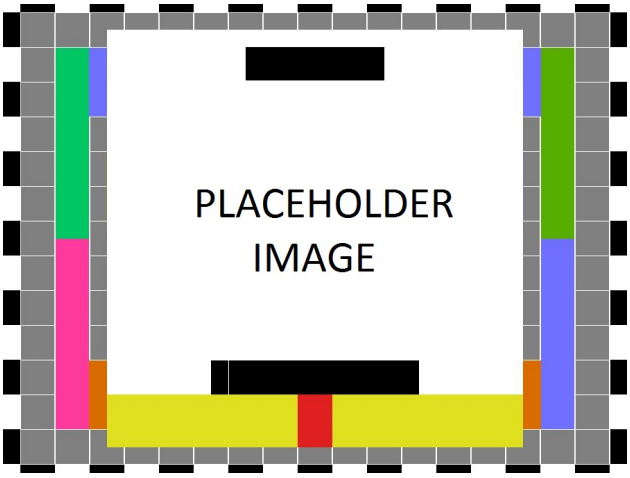

Figure 1: Example sprint burn down chart

13.2.7 Sprint Retrospective

How will the sprint retrospective be handled as a team? When will this discussion happen after each sprint? What will be documented as a group and as individuals, and when will it be due?

13.2.8 Individual Status Reports

What sort of status will be reported by each individual member, and how often will it be reported? What key items will be contained in the report?

13.2.9 Engineering Notebooks

How often will the engineering notebook be updated, at a minimum, by each team member? What is the minimum amount of pages that will be completed for each interval, and how long will that interval be? How will the team keep each member accountable? Who will sign of as a "witness" for each ENB page?

13.3 Closeout Materials

The following materials, in addition to major documentation deliverables, will be provided to the customer upon project closeout. Remove this paragraph from your draft, but leave the heading.

13.3.1 System Prototype

What will be included in the final system prototype? How and when will this be demonstrated? Will there be a Prototype Acceptance Test (PAT) with your customer? Will anything be demonstrated off-site? If so, will there be a Field Acceptance Test (FAT)?

13.3.2 Project Poster

What will be included on the poster, what will be the final dimensions, and when will it be delivered?

13.3.3 Web Page

What will be included on the project web page? Will it be accessible to the public? When will this be delivered? Will it be updated throughout the project, or just provided at closeout (at a minimum, you need to provide a simple web page at the end).

13.3.4 Demo Video

What will be shown in the demo video(s)? Will you include a B-reel footage for future video cuts? Approximately how long will the video(s) be, and what topics will be covered?

13.3.5 Source Code

How will your source code be maintained? What version control system will you adopt? Will source code be provided to the customer, or binaries only? If source code is provided, how will it be turned over to the customer? Will the project be open sourced to the general public? If so, what are the license terms (GNU, GPL, MIT, etc.). Where will the license terms be listed (in each source file, in a single readme file, etc.).

13.3.6 Source Code Documentation

What documentation standards will be employed? Will you use tools to generate the documentation (Doxygen, Javadocs, etc.). In what format will the final documentation be provided (PDF, browsable HTML, etc.)?

13.3.7 Hardware Schematics

Will you be creating printed circuit boards (PCBs) or wiring components together? If so, list each applicable schematic and what sort of data it will contain (PCB layout, wiring diagram, etc.). If your project is purely software, omit this section.

13.3.8 CAD FILES

Will the project involve any mechanical design, such as 3D printed or laser-cut parts? If so, what software will you use to generate the files and what file formats will you provide in your closeout materials (STL, STEP, OBJ, etc.). If your project is purely software, omit this section.

13.3.9 INSTALLATION SCRIPTS

How will the customer deploy software to new installations? Will you provide installation scripts, install programs, or any other tools to improve the process? Will there be multiple scripts provided (perhaps separate scripts for the graphical front end and back end server software)?

13.3.10 USER MANUAL

Will you customer need a printed or digital user manual? Will they need a setup video? Decide now what will be provided and discuss.